Analysis of QoS Parameters in DiffServ-enabled MPLS Networks

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The development and spreading of newer applications made the Internet a widely used medium. Hence, the volume of the forwarded traffic through the Internet is increasing, which means that the problem of sharing resources fairly and efficiently is getting more and more difficult. There are newer ways of using the Internet, traffic types are differentiated which require different forwarding methods. However, the transmission based on the Internet Protocol (IP) only can apply the best-effort algorithm currently, which is not enough for forwarding high quality voice and video, and serving businesses with the demanded value-added services.

Therefore various Quality of Service (QoS) parameters have to be provided, different guarantees are required for different types of traffic. In the network layer two architectures have been developed to solve this problem. One of these is the Integrated Services (IntServ) architecture where the routers handle the flows separately. This solution becomes difficult at larger networks because the network components have to manage too many flows, which raises scalability problems. The second solution is the Differentiated Services (DiffServ) [1] architecture where the flows are classified into service classes by their quality requirements (i.e., maximum packet loss, delay, jitter etc.). In this case, the traffic within the DiffServ domain is handled based on the classification rather then per flow. This is a more scalable way of forwarding traffic hence it is more promising in the near future.

Multiprotocol Label Switching (MPLS) [2] is another new technology for building transit domains. It combines the flexibility of the IP network layer with the benefits of a connection-oriented approach to networking. MPLS is a label-switched system that can carry multiple network layer protocols. Similar to Frame Relay, MPLS sends information over the network in frames or packets. Each frame/packet is labeled at an edge router and the network uses the label to decide the destination of the frame, without having to refer to a routing table, thus improving speed and scalability. MPLS adds traffic-engineering functions to IP, allowing service providers to route more efficiently and offer Quality of Service features.

In this paper both of the above techniques are discussed. In our interest there are two DiffServ-enabled domains on the sides and there is a third network between them. In the first scenario the third network operates without using the MPLS technology, while in the other case this is an MPLS network. In both scenarios the two adjacent DiffServ networks must have the ability to reach each other just like if the third domain would be a DiffServ domain. The goal of this paper is to make a comparison between the two scenarios and to check how the QoS parameters are fulfilled.

References

[1] S. Blake et al., "An Architecture for Differentiated Services", IETF – RFC 2475, December 1998

[2] E. Rosen et al., "Multiprotocol Label Switching Architecture", IETF – RFC 3031, January 2001